EH Resident Competency 1.21

Competency 1.21 **EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with materials handling and storage.**

1. Supporting Knowledge and Skills

a. Describe the safety hazards associated with crane and gantry operation during material handling and storage activities.

b. Describe the purpose of the load rating.

c. Describe the purpose of the Safety Bulletin on Suspect/Substandard Parts.

d. Discuss the limitations associated with stacking material.

e. Discuss the preventive measures to avoid the following storage area hazards:
- Tripping
- Fire
- Explosion
- Spills

2. Self-Study Activities (corresponding to the intent of the above competency)

Below are two web sites containing many of the references you may need.

Web Sites		
Organization	**Site Location**	**Notes**
Department of Energy	http://wastenot.inel.gov/cted/stdguido.html	DOE Standards, Guides, and Orders
OSHA	http://www.osha-slc.gov/	OSHA documents and search engine
U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations

Read 29 CFR 1910, Subpart N, “Materials Handling and Storage.”

Read 29 CFR 1910.179, Overhead and Gantry Cranes.

Review DOE/ID-10500, Hoisting and Rigging Manual.

Read Environment, Safety and Health Safety Bulletin, 93-6, DOE/EH-0342, “Take Special Care When Using Cranes.”

EXERCISE 1.21-A Describe the safety hazards associated with crane and gantry operation during material handling and storage activities.

EXERCISE 1.21-B Describe the purpose of the load rating.

Read Environment, Safety and Health Safety Bulletin, 92-4, DOE/EH-0266, “DOE Quality Alert.”

EXERCISE 1.21-C According to the safety bulletin, what are the two most common problems with counterfeit parts?

Review 29 CFR 1926.250, Materials handling, storage, use, and disposal.

EXERCISE 1.21-D Referring to 29 CFR 1926.250, in a building under construction, what is the requirement for material storage relative to hoist ways or inside floor openings?

EXERCISE 1.21-E Referring to 29 CFR 1926.250, what are the requirements for stacking bricks?

Review 29 CFR 1926.250, *Materials Handling, Storage, Use, and Disposal.*

EXERCISE 1.21-F Referring to 29 CFR 1926.250, what are the requirements for lumber storage?

Review 29 CFR 1926.250, (a)(3).

Review 29 CFR 1926.500.

Review 29 CFR 1926.252.

Read Environment, Safety and Health Safety Bulletin, 92-1, DOE/EH-0247, “Preventable injuries: Indoor slips and falls.”

EXERCISE 1.21-G Discuss the preventive measures to avoid the following storage area hazards:

- Tripping
- Fire
- Explosion

- Spills

3. Summary

There are many safety hazards associated with materials handling and storage that vary with the materials under consideration. Some of the most common safety-related issues are those dealing with crane and gantry operation, stacking of stored materials, and housekeeping issues. This competency covers a wide variety of handling and storage issues, but focuses on those considered to be most significant to worker safety.

During the decade ending in 1992, an average of 10 crane-related injuries and 1,200 lost work days were reported each year at DOE facilities. A total of 111 fatalities occurred in the United States between 1985 and 1989. The most common cause of crane accidents is contact with power lines. Fatal crane accidents are generally the result of electrocution. One-fourth of all nonfatal crane-related injuries reported occurred during rigging or maintenance activities.

"The use of cranes, forklifts, hoists, in-plant powered industrial trucks, and slings is subject to certain hazards that cannot be controlled by mechanical means. Only by the exercise of intelligence, care, and good sense can these hazards be met. It is essential to have competent and careful operators, physically and mentally fit, thoroughly trained to the safe operation of the equipment and the handling of the loads. Serious hazards are overloading, dropping or slipping of the load caused by improper hitching or slinging, obstruction to the free passage of the load, or using equipment for a purpose for which it was not intended or designed." DOE/ID-10500, *Hoisting and Rigging Manual*, 2.1, "Operator Training."

This information is from DOE/EH-0266, Issue No. 92-4, *Environment, Safety and Health Bulletin*: "As of June 1992, DOE contractors have reported finding in excess of 1,000,000 suspect/counterfeit bolts." An additional 700 suspect/counterfeit circuit breakers have also been reported. The U.S. Customs Service has prepared a Headmark List of bolts that should be considered suspect/counterfeit. Any bolts in the DOE community that are on the list should be rejected. Several other cautions are relevant. "Given the expense of removing suspect bolts from DOE facilities, the practice of using suspect bolts for any application should be stopped." Also, "all bolts purchased should be kept in the original packages, not emptied into bins."

4. Exercise Solutions

You may refer to any available references when completing the exercises.

EXERCISE 1.21-A Describe the safety hazards associated with crane and gantry operation during material handling and storage activities.

ANSWER 1.21-A Serious hazards are overloading, dropping or slipping of the load caused by improper hitching or slinging, obstruction to the free passage of the load, or using equipment for a purpose for which it was not intended or designed." DOE/ID-10500, *Hoisting and Rigging Manual*, 2.1, "Operator Training."

"A common cause of crane accidents involves contact with power lines. Fatal crane accidents are generally the result of electrocution." *Environment, Safety & Health Safety Bulletin*, 93-6, DOE/EH-0342, "Take Special Care When Using Cranes."

EXERCISE 1.21-B Describe the purpose of the load rating.

ANSWER 1.21-B Each crane is required to have a rated capacity marked on the side of the crane to provide the operator with the information necessary for safe operation. The load rating provides the maximum working load allowed for the crane. A crane may not be loaded beyond its rated capacity except for test purposes.

EXERCISE 1.21-C According to the safety bulletin, what are the two most common problems counterfeit parts?

ANSWER 1.21-C The two most common in counterfeit substandard parts are high-strength bolts and circuit breakers.

EXERCISE 1.21-D Referring to 29 CFR 1926.250, in a building under construction, what is the requirement for material storage relative to hoist ways or inside floor openings?

ANSWER 1.21-D "Material storage. (1) Material stored inside buildings under construction shall not be placed within six feet of any hoist way or inside floor openings, . . ." 29 CFR 1926.250, (b)

EXERCISE 1.21-E Referring to 29 CFR 1926.250, what are the requirements for stacking bricks?

ANSWER 1.21-E "Brick stacks shall not be more than seven feet in height. When a loose brick stack reaches a height of four feet, it shall be tapered back two inches in every foot of height above the 4-foot level." 29 CFR 1926.250, (b)(3)(6)

EXERCISE 1.21-F Referring to 29 CFR 1926.250, what are the requirements for lumber storage?

ANSWER 1.21-F "(i) Used lumber shall have all nails withdrawn before stacking.
(ii) Lumber shall be stacked on level and solidly supported sills.
(iii) Lumber shall be so stacked as to be stable and self-supporting.
(iv) Lumber piles shall not exceed 20 feet in height provided that lumber to be handled manually shall not be stacked more than 16 feet high." 29 CFR 1926.250, (b)(8)

EXERCISE 1.21-G Discuss the preventive measures to avoid the following storage area hazards:

- Tripping
- Fire
- Explosion
- Spills

ANSWER 1.21-G The single most critical issue in storage area accident prevention is housekeeping. "Storage areas shall be kept free from accumulation of materials that constituted hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary." 29 CFR 1926.250, C. Your answer may vary but should contain substantially the same information as that shown in the chart.

Storage Area Hazards and Preventive Measures	
Hazard	**Preventive Measure**
Tripping	Housekeeping and proper illumination are key to avoiding tripping hazards. "Aisles and passageways shall be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas shall be kept in good repair." 29 CFR 1926.250, (a)(3) Additionally, 29 CFR 1926.500, "Guardrails, handrails, and covers," provides the requirements for these safety items.
Fire	Housekeeping (including proper segregation of materials), appropriate fire protection equipment, and proper employee training are the primary considerations in storage areas for fire protection. "All solvent waste, oily rags, and flammable liquids shall be kept in fire-resistant, covered containers until removed from the worksite." 29 CFR 1926.252, (e) Additionally, some materials such as hazardous waste, radioactive materials, and flammable and combustible liquids have particular regulations and restrictions relevant to fire protection. The OSHA requirements for flammable and combustible liquids are found in 29 CFR 1910.106.
Explosion	Review Competency 1.14 on explosives safety for appropriate assistance with this response. The OSHA requirements for flammable and combustible liquids found in 29 CFR 1910.106 also deal with the explosive hazards presented by these materials.
Spills	Spills are the source of several on-the-job hazards. Spills of flammable or combustible liquids may cause fires. Spills of caustic or corrosive materials may cause burns or skin and eye damage. Other spills may result in tripping or falls. Housekeeping is the critical factor in spills hazard reduction, but emphasis must also be placed on training. "(i) General. Maintenance and operating practices shall be in accordance with established procedures that will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly." 29 CFR 1910.106 (e) (8) "The floor of every workroom shall be maintained in a clean and, so far as possible, dry condition." 29 CFR 1910.22(a)(2)